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Fire resistance test report

Test standard: Sections 2 and 3 of AS 1530.4:2014

Test sponsor: Trafalgar Group Pty Ltd

Product: Trafalgar bushfire wall system

Job number: FRT220334

Test date: 19 January 2023 Revision: R2.0

Warringtonfire: accredited for compliance with ISO/IEC 17025 – Testing

ilac-MRA NATA Accreditation No. 3277

Quality management

Revision	Date	Information about the report			
R2.0	28 April 2023	Description	Initial issue		
			Prepared by	Reviewed by	Authorised by
		Name	Jaxsen Lee	Gabriel Raposo	Masis Altun
		Signature			

Executive summary

This report documents the findings of the fire resistance test of a non-loadbearing wall system in accordance with sections 2 and 3 of AS 1530.4:2014. The testing was done on 19 January 2022.

Warringtonfire performed the test at the request of Trafalgar Group Pty Ltd.

Table 1 provides details of the test assembly, and Table 2 provides a summary of the test specimen. A summary of the results is provided in Table 3.

Table 1 Test assembly

Item	Detail	
Non-loadbearing wall system	Width	3000 mm
	Height	3000 mm
	Thickness	154 mm
Restraint conditions	Restrained along the top, bottom and south vertical edges. The north edge was free from lateral restraint.	

Table 2 Test specimen

Item	Detail
Test specimen	• The system consisted of a 3000 mm × 3000 mm timber frame made of 90 mm × 45 mm MGP10. • 90 mm × 45 mm MGP10 noggings were installed at nominal 2400 mm height from the base of the wall and 90 mm × 45 mm MGP10 studs were installed at nominal 600 mm centres. • The system had included R3.0 rock wool insulation installed in the cavity. • One layer of 10 mm standard plasterboard was installed vertically on the unexposed side. The plasterboard layer was installed with recess joints over 2 studs and was secured to the timber framing with Type S #6-18 × 32 mm screws. The screws were located at nominal 300 mm maximum centres and 12 mm away from the joints. Whilst on the butt joints, screws were located at nominal 585 mm maximum centres, 25 mm away from the joints and at nominal 600 mm maximum centres in the field. • One layer of 12.5 mm Dalsan BoardeX board was installed vertically on the exposed side. The board was installed with recess joints over 2 alternative studs and was secured to the timber framing with 38 mm crown staples located at nominal 200 mm maximum centres, 15 mm away from the joints. Whilst on the butt joints staples were located at nominal 585 mm maximum centres, 50 mm away from the joints and at nominal 600 mm maximum centres in the field. • 40 mm G550 grade steel top hats were installed horizontally on the exposed side, at nominal 550 mm maximum centres on top of the BoardeX boards and secured with #14-10 × 65 mm timber screws located at nominal 575 mm centres through the mid-width of both top and bottom flanges. • One layer of sarking was installed with a nominal 150 mm overlap on the exposed side and secured with 8g × 12 mm screws located at nominal 600 mm maximum centres and nominal 20 mm from the side edges into the mid-width of the top hats. • BlueScope Custom ORB® sheet was installed vertically on the exposed side on top of the sarking and secured to the top hats with 12g × 45 mm hex head SDS screws.

Table 3 Test results

Criteria	Results	Fire resistance level (FRL)
Structural adequacy	Not applicable	**-/30/30**
Integrity	No failure at 30 minutes	
Insulation	No failure at 30 minutes	

Note: The FRLs for the specimens only apply to the tested orientation. As the FRL was only determined for one direction, an FRL cannot be assigned for the other direction.

Contents

1. Introduction

This report documents the findings of the fire resistance test of a non-loadbearing wall system in accordance with sections 2 and 3 of AS 1530.4:2014. The testing was done on 19 January 2022.

Warringtonfire performed the test at the request of the test sponsor listed in Table 4.

Table 4 Test sponsor details

Test sponsor	Address
Trafalgar Group Pty Ltd	26 Ferndell Street South Granville NSW 2142 Australia

2. Test specimen

2.1 Schedule of components

Table 5 describes the test specimen and lists the schedule of components. These were provided by the test sponsor and surveyed by Warringtonfire.

All measurements were done by Warringtonfire – unless indicated otherwise.

Detailed drawings of the test specimen are provided in Appendix A.

Table 5 Schedule of components

Item	Description	
Unexposed cladding		
1.	Item name	Standard plasterboard
	Product name	Gyprock® PLUS RE Optimised Core plasterboard
	Manufacturer	CSR Building Products Pty Ltd
	Size	3000 mm long × 1200 mm wide × 10 mm thick (cut to size)
	Batch no.	9314450007016
	Mass density	5.7 kg/m^2
Framing		
2.	Item name	Timber framing
	Product name	MGP10
	Species	Radiata pine
	Supplier	Westall timber
	Size	90 mm wide × 45 deep (cut to length)
	Batch no.	32028028
	Density	547 kg/m^3
	Moisture content	9.8%
3.	Item name	Top hat batten
	Product name	TOPSPAN® 40
	Product code	TS4048
	Manufacturer	Lysaght®, BlueScope Steel
	Size	90 mm × 40 mm × 42 mm × 0.48 BMT (cut to length)
	Average thickness	0.51 mm (TCT)
	Material	Next Generation Zincalume® AM 150 G550 grade steel

Item	Description	
	Batch no.	PM1Z169975
Insulation		
4.	Item name	Mineral wool insulation batts
	Product name	MG Board™ 60 Rockwool
	Manufacturer	PT. Nichias Rockwool Indonesia
	Material R-value	R3.0
	Size	1200 mm long × 600 mm wide × 100 mm thick (cut to suit)
	Density	49 kg/m^3 (measured)
	Lot no.	2206093C
Exposed cladding		
5.	Item name	Exposed cladding
	Product name	BoardeX
	Manufacturer	Dalsan Alçı Sanayi ve Ticaret A.Ş.
	Size	2400 mm long × 1200 mm wide × 12.5 mm thick (cut to length)
	Average thickness	12.2 mm
	Mass density	10.6 kg/m^2
6.	Item name	Sarking
	Product name	SilverSark® sarking Heavy Duty (non-permeable)
	Manufacturer	Ametalin
	Size	1350 mm long × 0.12 mm (cut to length)
	Average thickness	0.1 mm
	Code no.	HD-81
7.	Item name	Corrugated wall cladding
	Product name	Custom® ORB corrugated wall sheeting
	Manufacturer	Lysaght®, BlueScope Steel
	Size	3005 mm long × 845 mm wide (nominal cover width) × 0.42 BMT
	Average thickness	0.4 mm
	Material	Next Generation Zincalume® AM125 G550 grade steel
	Batch no.	F21622
Sealant/Adhesive		
8.	Item name	Fire rated sealant
	Product name	FyreFlex sealant:
	Manufacturer	Trafalgar Group Pty Ltd
	Batch no.	0921935317
	Density	1460 kg/m^3
9.	Item name	Construction sealant
	Product name	TREMstop PU+ (polyurethane joint sealant)
	Manufacturer	Tremco CPG Australia Pty Ltd
	Lot no.	AT22261380
	Density	1195 kg/m^3

Item	Description	
10.	Item name	Base coat
	Product name	Gyprock® multi-purpose joint compound
	Manufacturer	CSR Building Products Pty Ltd
11.	Item name	Joint tape
	Product name	Gyprock® Easy Tape
	Manufacturer	CSR Building Products Pty Ltd
	Size	50 mm width
Fixings		
12.	Item name	Screw bolt
	Product description	Zinc yellow XBolt – Hex flange head M6 × 75 mm screw anchor
	Supplier	Hobson Engineering
	Lot no.	ZC-102V712
13.	Item name	Framing nails
	Product description	75 mm × 3.06 mm mild steel
	Manufacturer	Melbourne Nails Australia Pty Ltd
14.	Item name	Plasterboard screws
	Product description	Type S 6-18 × 32 mm screws
	Manufacturer	CSR Building Products Ltd
	Product code	169072
15.	Item name	Crown staples
	Product description	Narrow Crown Staples, 38 mm 6000 series galvanised steel
	Supplier	PowerFit
16.	Item name	Framing screw
	Product description	14-10 × 65 mm T17 hex flange washer head with seal screw
	Supplier	Hobson Engineering
	Lot no.	HX21Y08M26B301
17.	Item name	Sarking screw
	Product description	8g × 12 mm button head self-drilling screw
	Manufacturer / supplier	Economy Bolt Pty Ltd
18.	Item name	Exposed sheet screws
	Product description	12-14 × 45 mm hex flange washe headr SDS screw
	Supplier	PorFast Trading Pty Ltd
	Batch no.	PO10814
Instrumented noggings		
19.	Item name	Timber nogging
	Product name	MGP10
	Species	Radiata pine
	Supplier	Westall timber
	Size	90 mm wide × 45 deep × 555 mm long
	Batch no.	32028028

Item	Description	
	Density	547 kg/m^3
	Moisture content	9.8%
20.	Item name	Steel nogging
	Product name	Instrumented steel nogging
	Supplier	Unknown
	Size	94 mm wide × 32 mm deep × 555 mm long
	Average thickness	0.80 mm (TCT)
	Material	Mild steel
Installation method		
Wall system	Overall size	3000 mm wide × 3000 mm high × 154 mm thick
	Restraint conditions	Restrained along the top, bottom and south vertical edges. The north edge was free from lateral restraint.
	Installation	• The timber frame (item 2) was assembled using two 3000 mm long timber top and bottom plates, with six 2910 mm timber studs located in between at 600 mm nominal centres. Five 555 mm long timber noggings were located between the studs in a straight line, 2400 mm from the bottom of the wall system. All components of the frame were secured together using the framing nails (item 13). • Rockwool insulation batts (item 4) were friction fitted between the studs. • Standard plasterboard (item 1) was installed vertically on the unexposed side of the timber frame and secured using 6-18 × 32 mm needle point screws (item 14). • The screws in general were located 30 mm away from top and bottom edges of the specimen, and 25 mm away from northern and southern edges. Screws were also located 12 mm away from the edge on the recess joints, at nominal 600 mm maximum centres in the field and at nominal 300 mm centres vertically. Screws were further located 30 mm away from the edge of the butt joints, at nominal 585 mm maximum centres. • A single layer of exposed cladding boards (item 5) were installed vertically on the exposed side of the timber framing. The board was installed with the recess joints located over 2 alternative studs and was secured to the timber framing with 38 mm staples (item 15) at nominal 200 mm maximum centres, 15 mm away from the recess joints. Whilst on the butt joints staples were located 50 mm away from the joints, at nominal 585 mm maximum horizontal centres and at nominal 600 mm maximum vertical centres. • Construction sealant (item 9) was installed in between boards. • 40 mm steel top hats (item 3) were installed horizontally on the exposed side of the BoardeX board, at nominal 550 mm maximum centres and secured back to the timber framing using 14g × 65 mm timber screws (item 16) located at nominal 575 mm centres along the mid-width of both the top and bottom flanges. • Sarking (item 6) was installed on the exposed side of the top hats and secured with 8g × 12 mm button head screws (item 17) at nominal 600 mm maximum centres, nominally 20 mm away from the side edges into the mid-width of the top hats. There was nominal 150 mm overlap between adjoining runs of the sarking. • Custom ORB® corrugated sheeting (item 7 was installed vertically on the exposed side of the sarking and secured to the top hats (item 3) through every third crest, with 14g × 45 mm hex SDS screws (item 18).

2.2 Installation details

Table 6 lists the installation details for the test specimen.

Table 6 Installation details

Item	Detail
Start date for construction of test specimen	5 December 2022
Completion date for construction of test specimen	9 December 2022
Wall system constructed by	Representatives of the test sponsor
Symmetry	The system was asymmetrical due to: • Plasterboard was installed on the unexposed side only. BoardeX cladding, top hats, sarking and corrugated sheeting were installed on the exposed side only.

3. Test procedure

Table 7 details the test procedure for this fire resistance test.

Table 7 Test procedure

Item	Detail	
Statement of compliance	The test was performed in accordance with the requirements of sections 2 and 3 of AS 1530.4:2014 appropriate for a non-loadbearing wall system.	
Variations	None	
Pre-test conditioning	The assembly of the test specimen was completed on 9 December 2022 and tested on 19 January 2023. The test specimen was subjected to normal laboratory temperatures and conditions between the completion of assembly of the test specimen and the start of the test.	
Sampling / specimen selection	The laboratory was not involved in sampling or selecting the test specimen for the fire resistance test. The results obtained during the test only apply to the test samples as received and tested by Warringtonfire.	
Ambient laboratory temperature	Start of the test	26 °C
	Minimum temperature	26 °C
	Maximum temperature	27 °C
Test duration	30 minutes	
Instrumentation and equipment	The instrumentation was provided in accordance with AS 1530.4:2014 as follows: • The furnace temperature was measured by nine mineral insulated metal sheathed (MIMS) Type K thermocouples – with wire diameters not greater than 1 mm, an overall diameter of 3 mm, and the measuring junction insulated from the sheath. The thermocouples protruded a minimum of 25 mm from steel supporting tubes. • The unexposed side specimen temperatures were measured by Type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads. • The internal temperatures of the specimen were measured by Type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads.	

Item	Detail
	• The thermocouple positions are shown in Table 10 and in Figure 5 in Appendix D. • A roving thermocouple was available to measure temperatures at positions that appeared hotter than the positions monitored by the fixed thermocouples. • Cotton pads were available during the test to assess the performance of the specimen under the criteria of integrity. • Gap gauges were available during the test to assess the performance of the specimen under the criteria of integrity. • Deflection measurements were taken from wire drawn encoders at the positions shown in Table 11 and in Figure 5 in Appendix D. • The furnace pressure was measured at approximately 1000 mm above the bottom edge of the specimen.

4. Test measurements and results

Table 8 summarises the results the specimen achieved against the performance criteria listed in sections 2 and 3 of AS 1530.4:2014.

Appendix E includes details of the measurements taken during the test.

Table 9 in Appendix B includes observations of any significant behaviour of the specimen and details of the occurrence of the various performance criteria specified in AS 1530.4:2014.

Appendix D includes instrumentation details of the specimen.

Photographs of the specimen are included in Appendix F.

Table 8 Test results

Criteria	Results	Fire resistance level (FRL)
Structural adequacy	Not applicable	**-/30/30**
Integrity	No failure at 30 minutes	
Insulation	No failure at 30 minutes	

Note: The FRLs for the specimens only apply to the tested orientation. As the FRL was only determined for one direction, an FRL cannot be assigned for the other direction.

5. Application of test results

5.1 Test limitations

The results of these fire tests may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

These results only relate to the behaviour of the specimen of the element of construction under the particular conditions of the test. They are not intended to be the sole criteria for assessing the potential fire performance of the element in use, and they do not necessarily reflect the actual behaviour in fires.

5.2 Variations from the tested specimen

This report details methods of construction, the test conditions and the results obtained when the specific element of construction described here was tested following the procedure outlined in AS 1530.4:2014. Any significant variation with respect to size, construction details, loads, stresses, edge or end conditions, other than that allowed under the field of direct application in the relevant test method, is not covered by this report.

It is recommended that any proposed variation to the tested configuration – other than as permitted under the field of direct application specified in Appendix C – should be referred to the test sponsor. They should then obtain appropriate documentary evidence of compliance from Warringtonfire or another accredited testing authority.

5.3 Uncertainty of measurements

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy for the result.

Appendix A Drawings of test assembly

The leaders in the drawings represent the items listed in section 2.1. All measurements – unless indicated – are in millimetres.

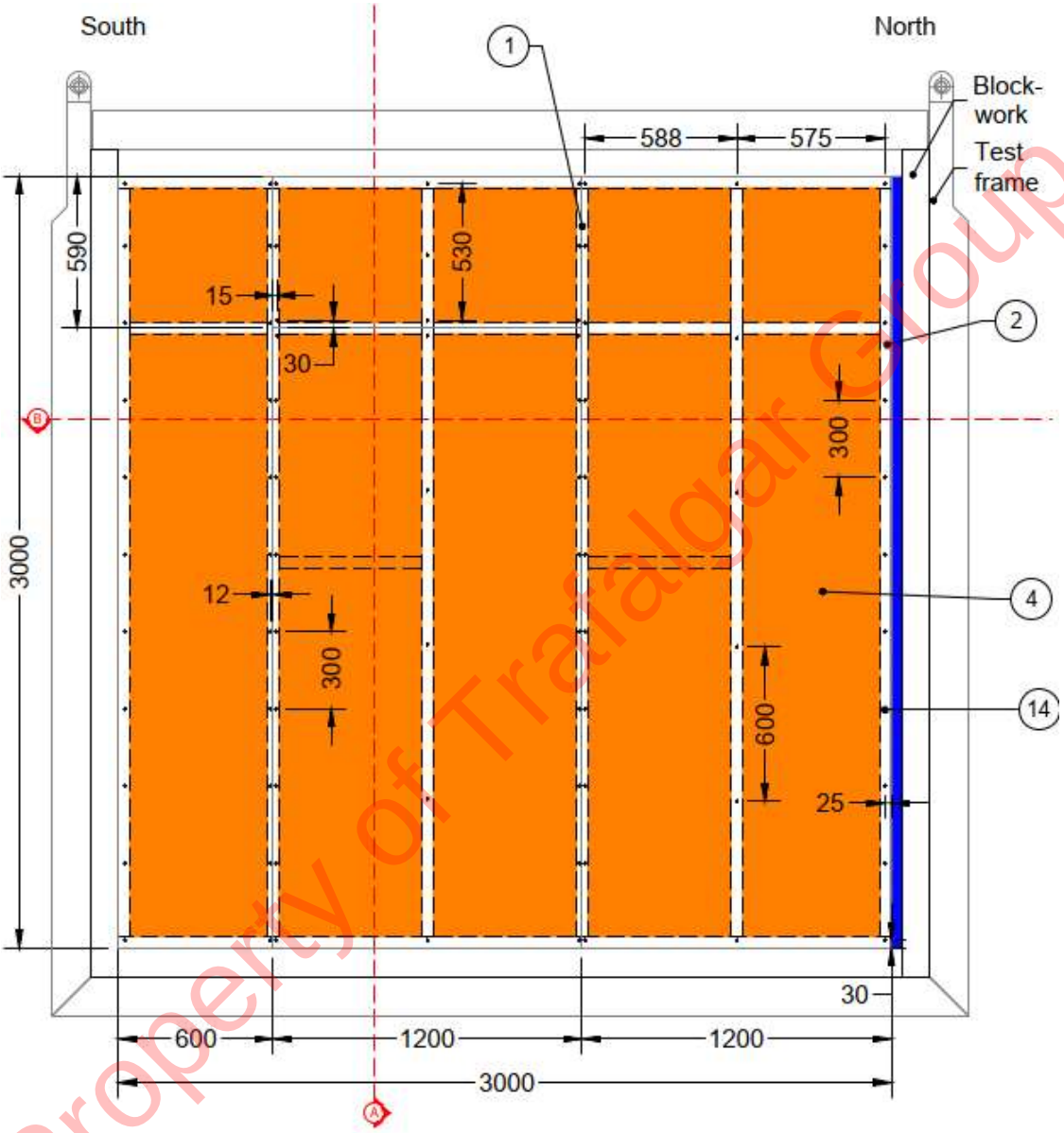


Figure 1 Elevation view of test specimen (unexposed side)

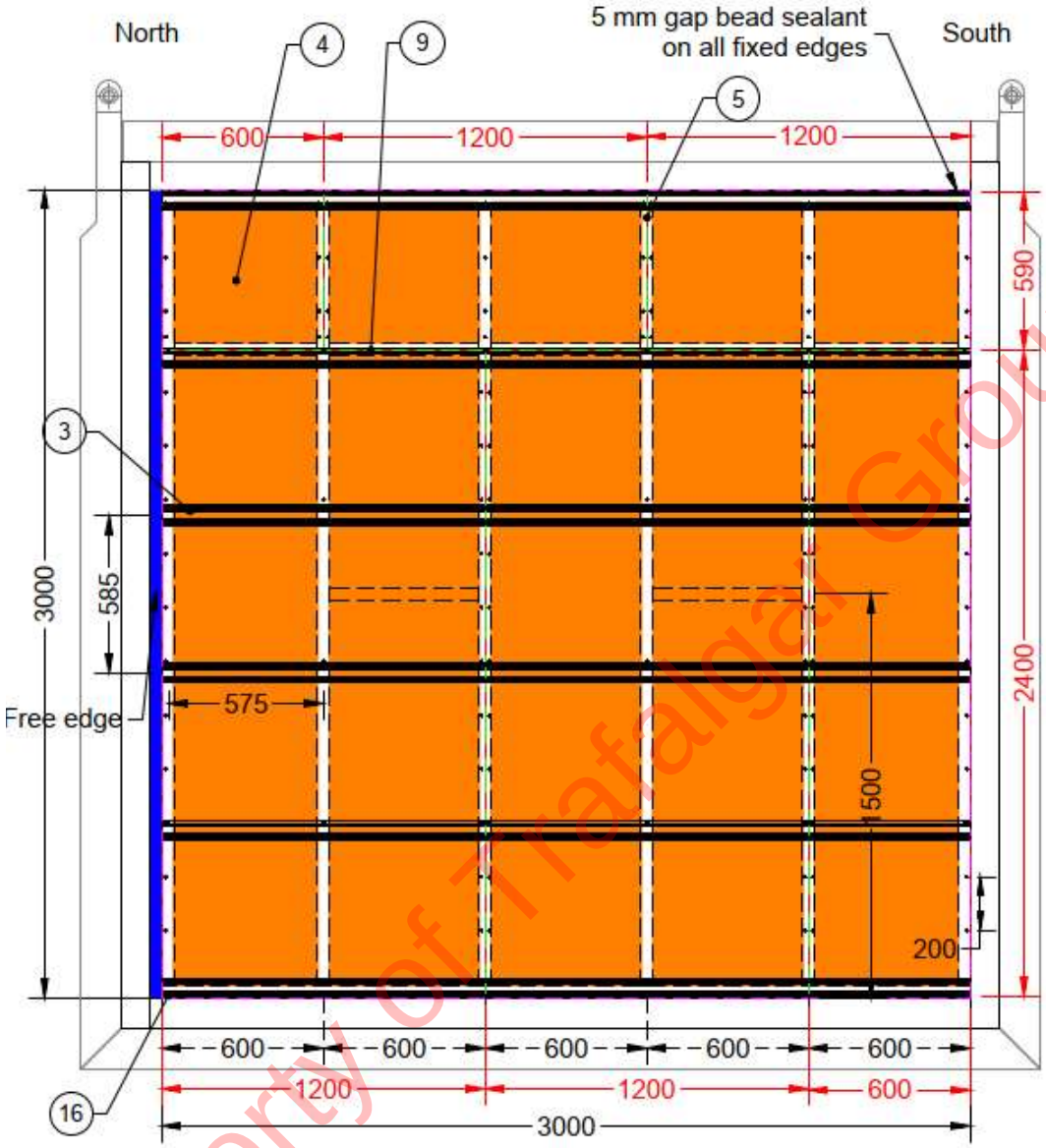


Figure 2 Elevation view of test specimen (exposed side)

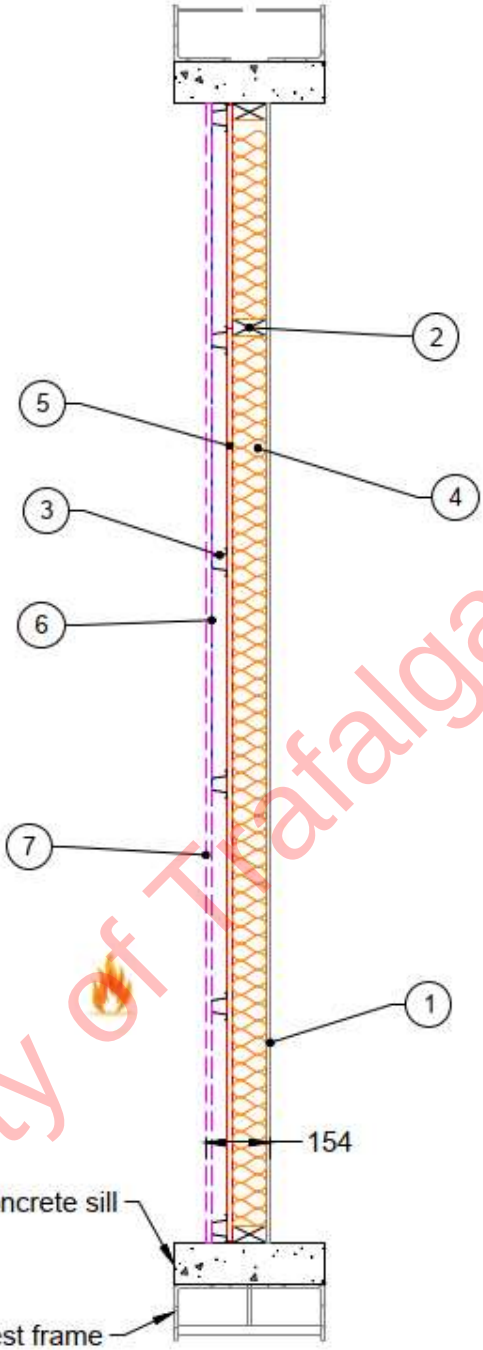


Figure 3 Vertical cross-section A-A

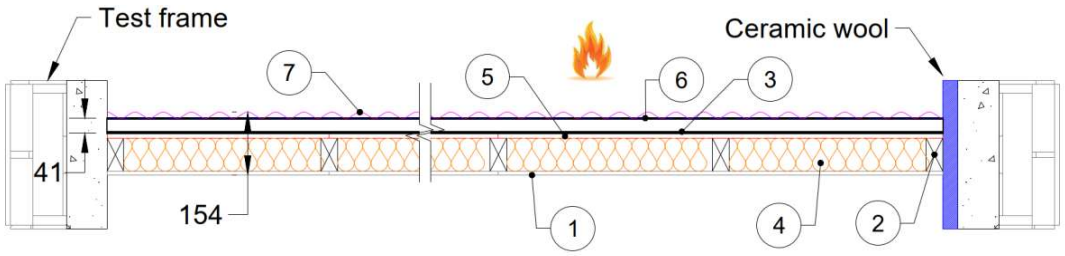


Figure 4 Horizontal cross-section B-B

Appendix B Test observations

Table 9 shows the observations of any significant behaviour of the specimen during the test.

Table 9 Test observations

Time		Observation
Min	Sec	
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 22 °C.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. Test stopped.

Appendix C Direct field of application

Note: The text in this appendix has been taken from section 3 of AS 1530.4:2014.

The results of the fire tests in this report are directly applicable, without reference to the testing authority, to similar constructions where one or more of the following changes have been made – provided no individual component is removed or reduced:

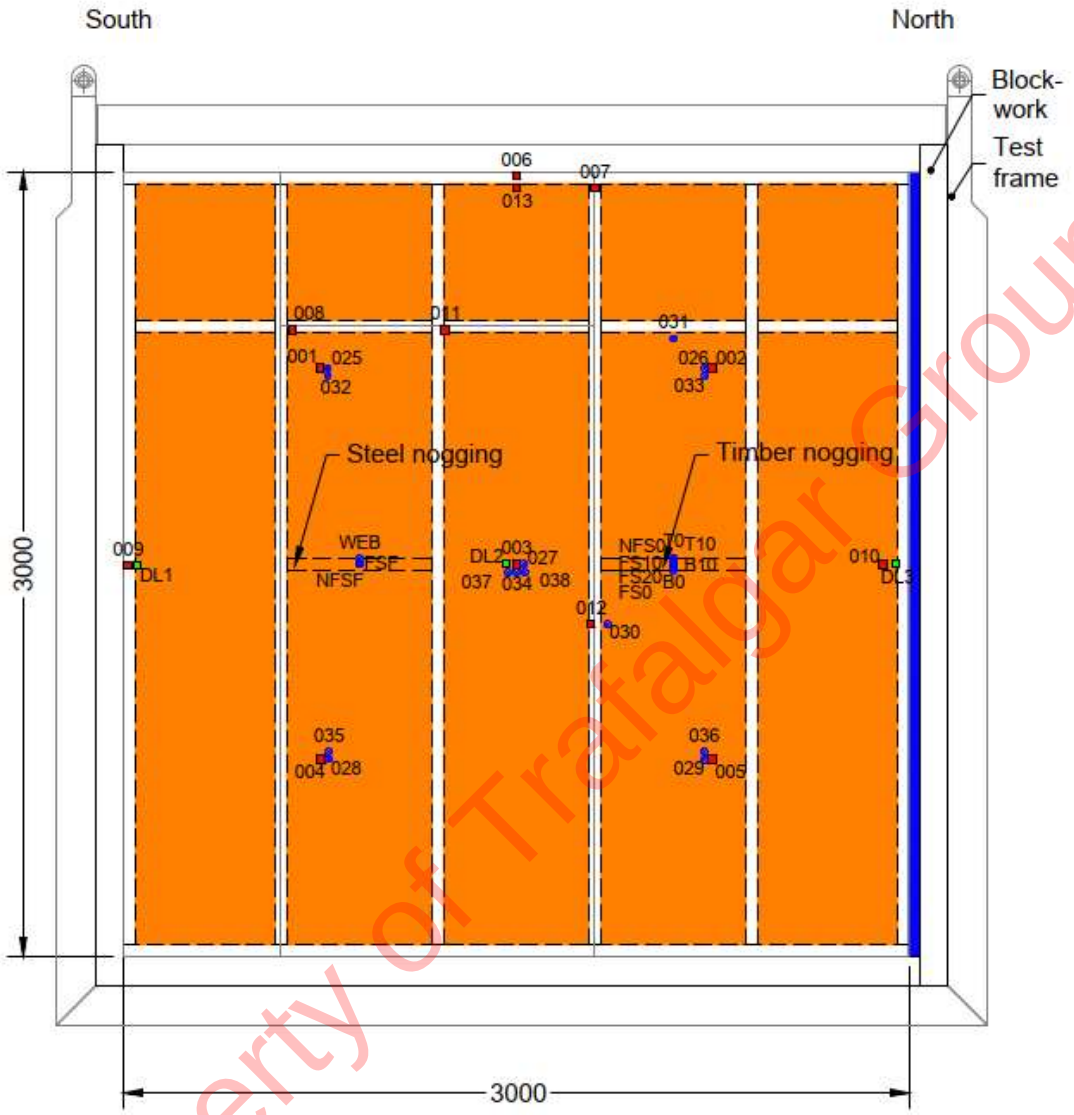
An increase in the length of a wall of identical construction if the specimen was tested with one vertical edge unrestrained.

An increase in the thickness of the wall.

For framed walls –

- an increase in timber density
- an increase in the cross-sectional dimensions of the framing element/s
- an increase in steel thickness up to a maximum of 2mm
- a decrease in sheet or panel sizes
- a decrease in stud spacing
- a decrease in fixing centres of wall sheet materials.

Appendix D Instrumentation locations



Note:

- Red dots show surface thermocouple locations.
- Blue dots show internal thermocouple locations.
- Green dots show deflection locations.

Figure 5 Instrumentation locations (unexposed side view)

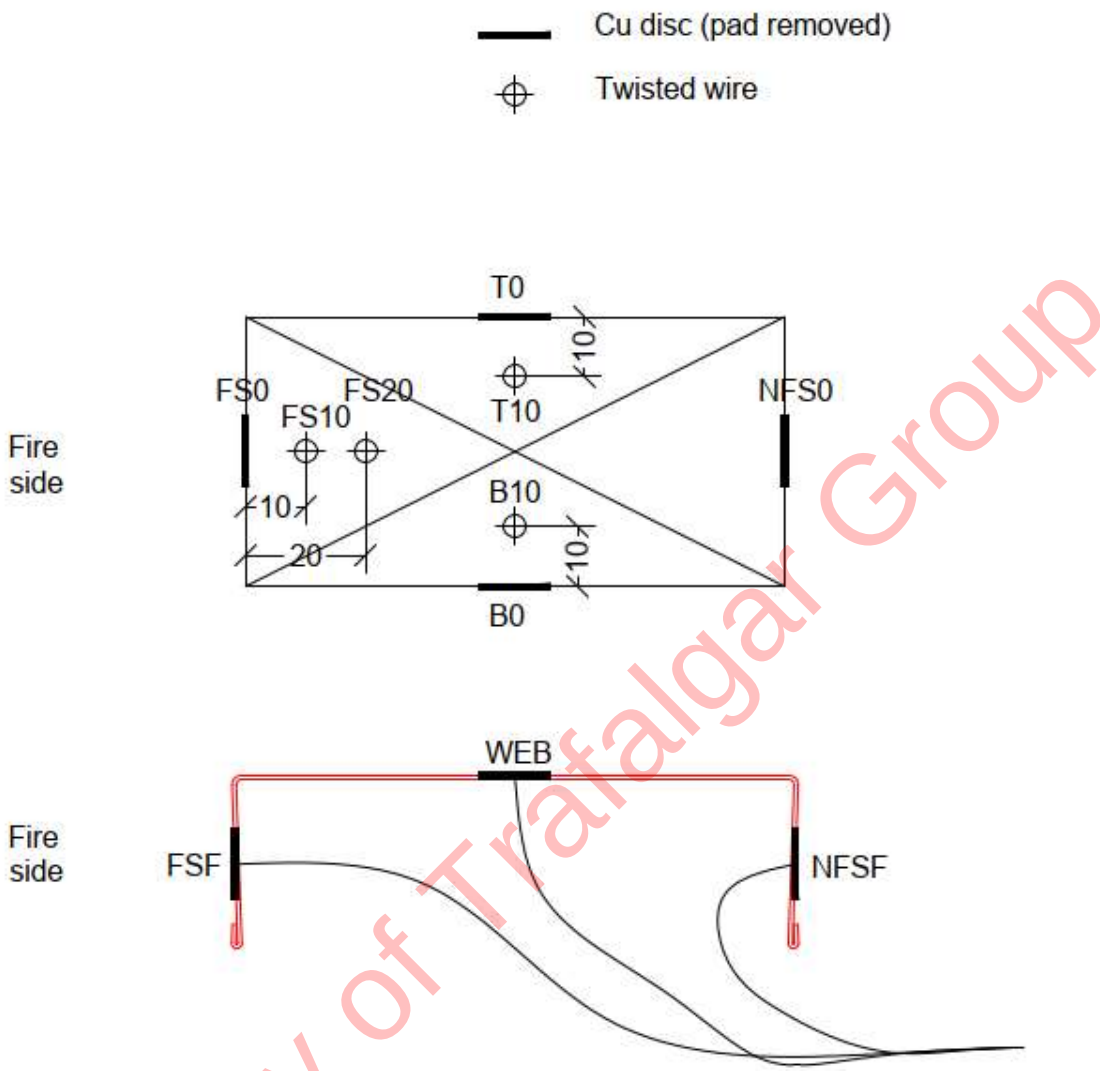


Figure 6 Instrumentation locations (instrumented noggings)

Table 10 Thermocouple locations

Location	T/C #	Description
Quarter and centre points	001	Upper south quarter point.
	002	Upper north quarter point.
	003	Centre of specimen.
	004	Lower south quarter point.
	005	Lower north quarter point.
Other surface	006	At the head of the specimen, mid-width.
	007	At the head of the specimen, in line with the stud.
	008	At the junction of a stud and nogging in a framed wall system.

Location	T/C #	Description
	009	Mid-height of the south fixed edge.
	010	Mid-height of the north free edge, 100 mm from the edge.
	011	Mid-width, 15 mm from a horizontal joint.
	012	Mid-height, 15 mm from a vertical joint.
	013	At 60 mm from the head of the specimen, mid-width.
Steel nogging	014	Steel nogging, fire side, FS
	015	Steel nogging, non-fire side, NFS
	016	Steel nogging, web, WEB
Timber nogging	017	Timber nogging, fire side, FS0
	018	Timber nogging, 10 mm from the fire side, FS10
	019	Timber nogging, 20 mm from the fire side, FS20
	020	Timber nogging, on the top side, T0
	021	Timber nogging, 10 mm from the top side, T10
	022	Timber nogging, on the bottom side, B0
	023	Timber nogging, 10 mm from the bottom side, B10
	024	Timber nogging, non-fire side, NFS
Internal (on the unexposed side of the BoardeX sheeting)	025	Internal upper south quarter point.
	026	Internal upper north quarter point.
	027	Internal centre of specimen.
	028	Internal lower south quarter point.
	029	Internal lower north quarter point.
	030	Mid-height, 25 mm from a vertical joint.
	031	Mid-width, 25 mm from a horizontal joint.
Internal (on the unexposed side of the corrugated sheeting)	032	Internal upper south quarter point.
	033	Internal upper north quarter point.
	034	Internal centre of specimen.
	035	Internal lower south quarter point.
	036	Internal lower north quarter point.
	037	Mid-height, 25 mm from an overlap vertical joint.
	038	Mid-height, 25 mm from an overlap vertical joint.

Table 11 Deflection locations

Part of specimen	Ref	Description
Horizontal	DL1	50 mm from the fixed south edge of the plasterboard mid-height.
	DL2	Centre of the plasterboard at mid-height.
	DL3	50 mm from the free north edge of the plasterboard mid-height.

Appendix E Test data

E.1 Furnace temperature and severity

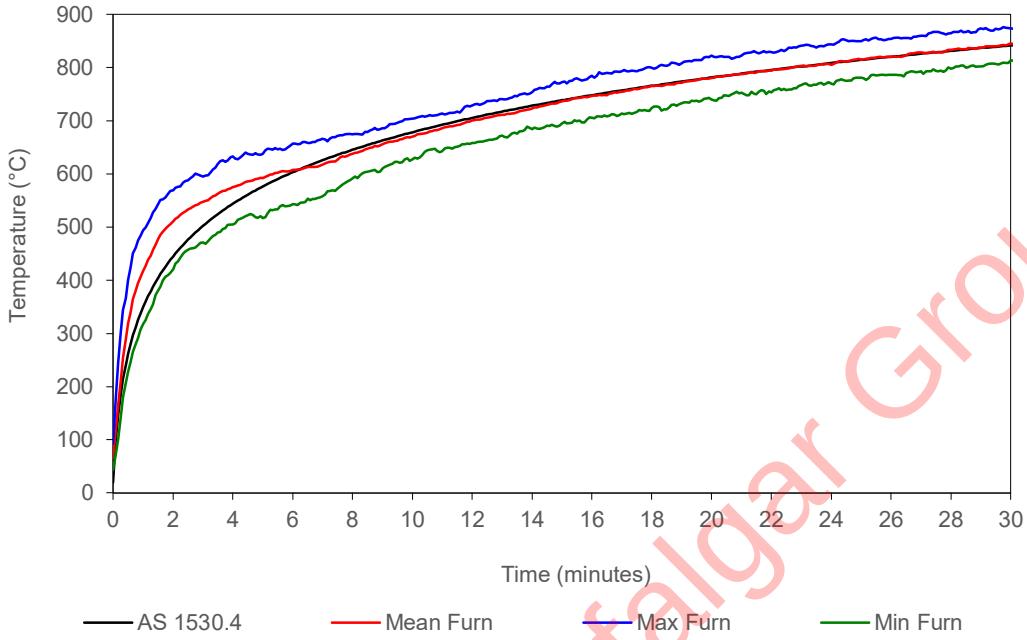


Figure 7 Furnace thermocouple temperature vs time

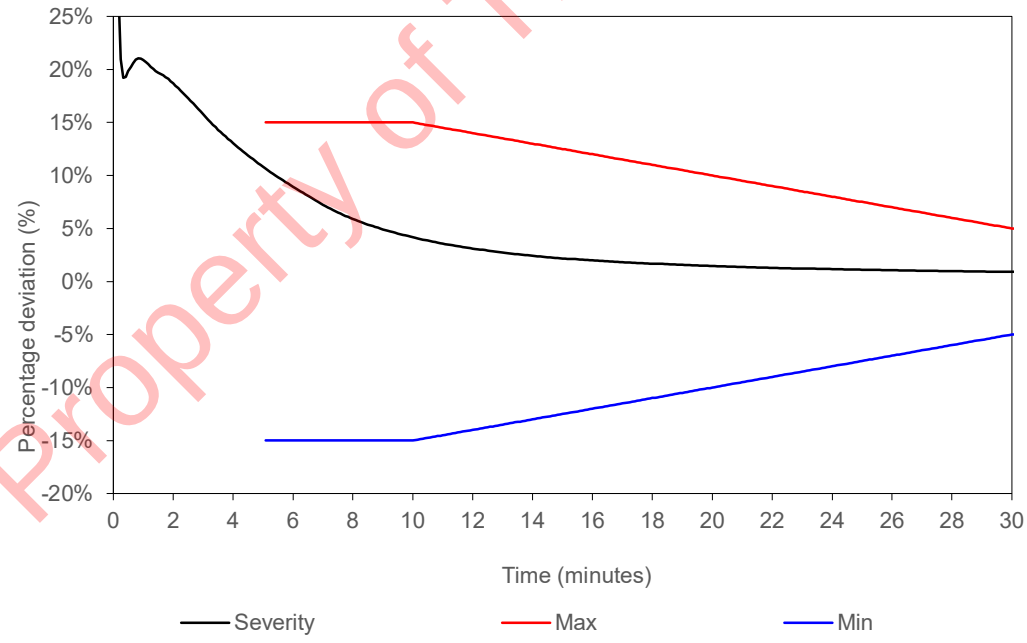


Figure 8 Percentage deviation of exposure severity vs time

E.2 Furnace pressure

The furnace pressure was measured at 1000 mm above the bottom edge of the specimen and corrected to reflect the pressure at 500 mm above the bottom edge of the specimen.

Table 12 Furnace pressure

Time (minutes)	Average pressure (Pa)
5-10	0
10-15	0
15-20	0
20-25	0
25-30	0

E.3 Specimen temperatures

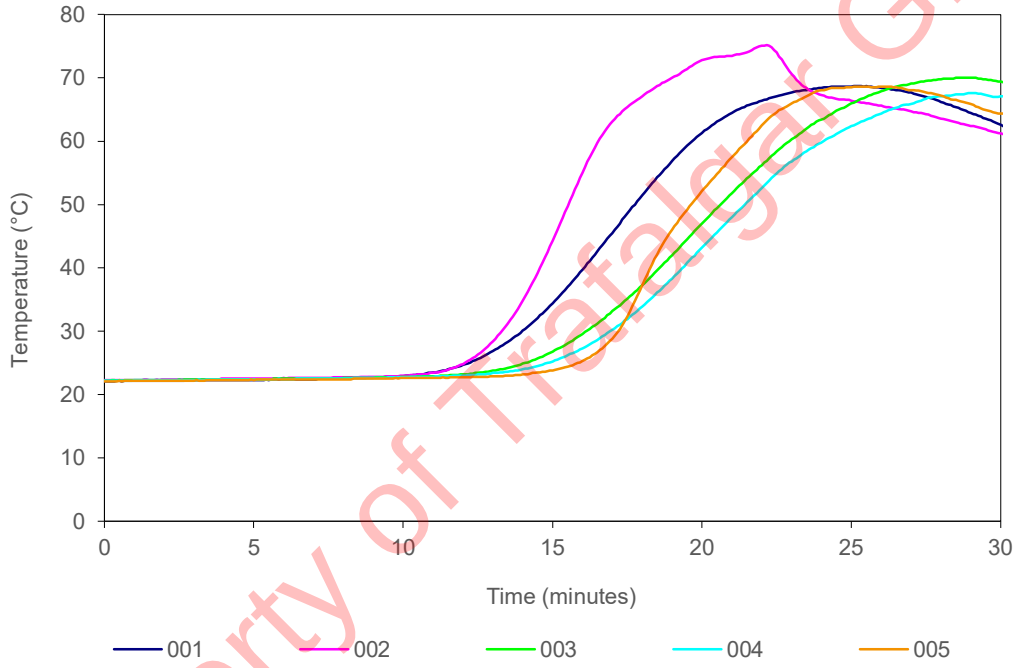


Figure 9 Quarter and centre points on the unexposed side of external wall – temperature vs time

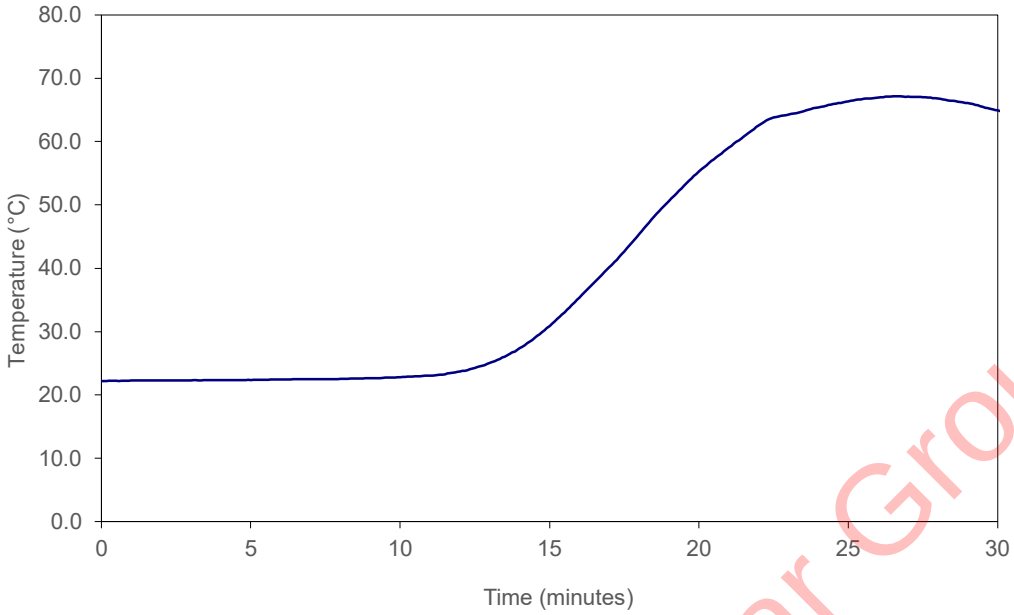


Figure 10 **Quarter and centre point on the unexposed side of external wall – average temperature vs time**

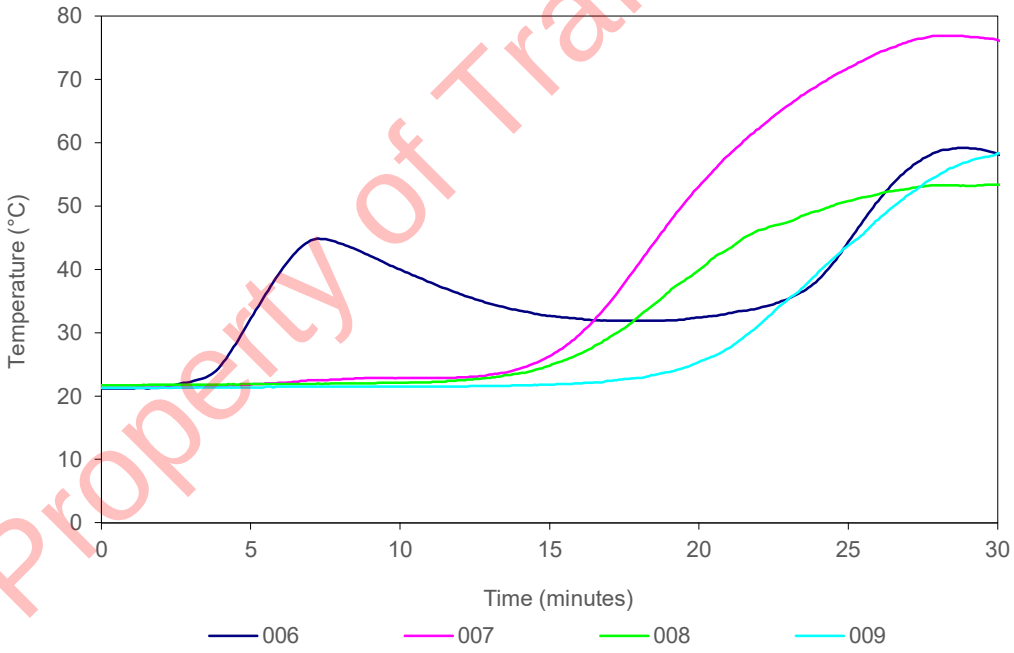


Figure 11 **Other surface – temperature vs time**

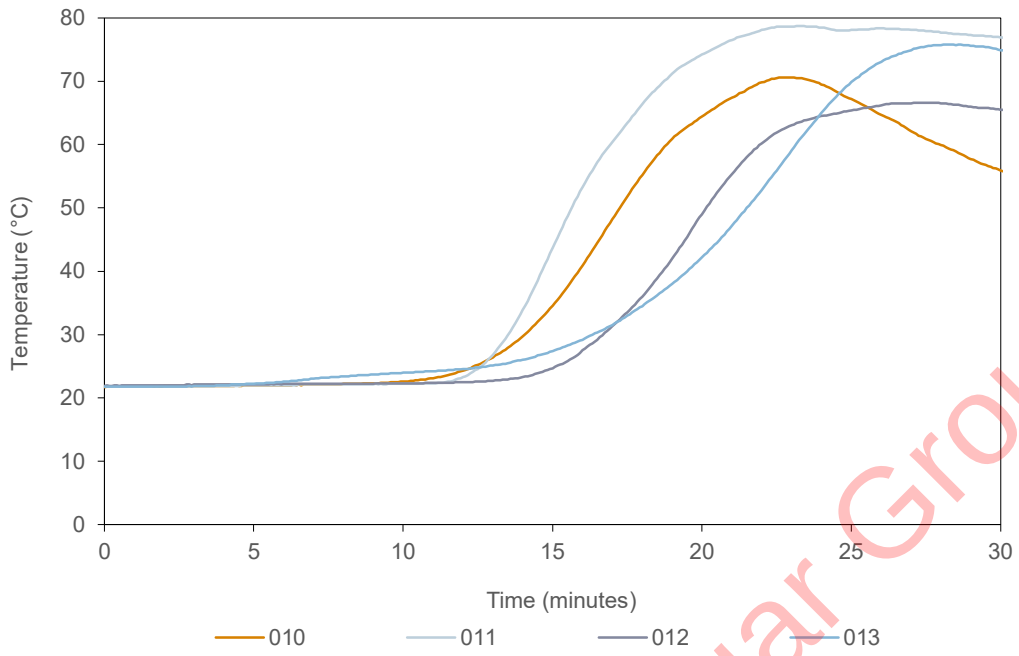


Figure 12 Other surface – temperature vs time

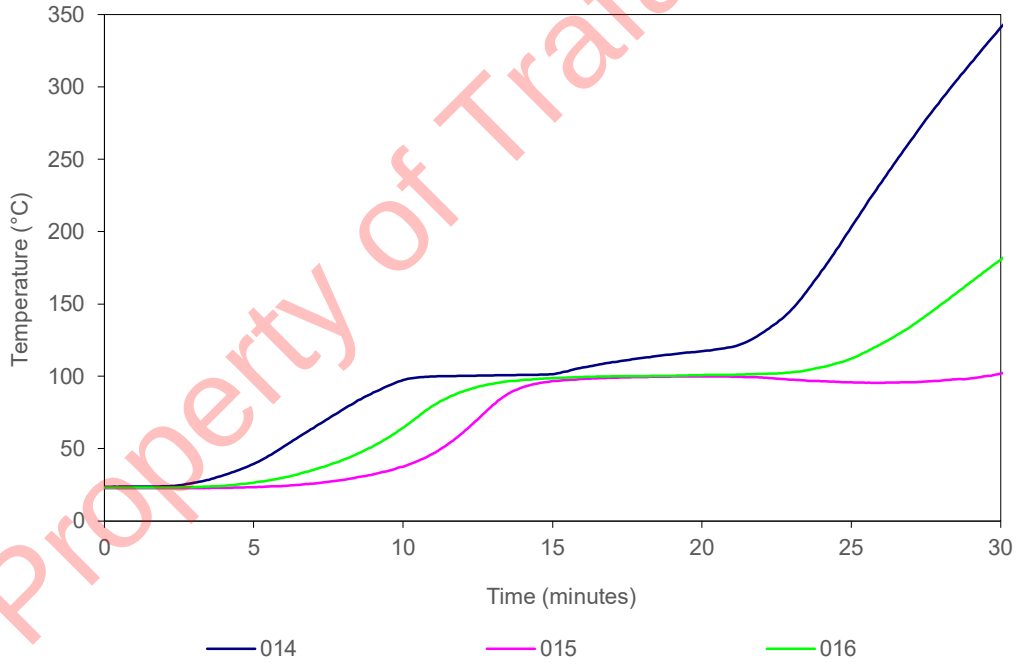


Figure 13 Steel nogging – temperature vs time

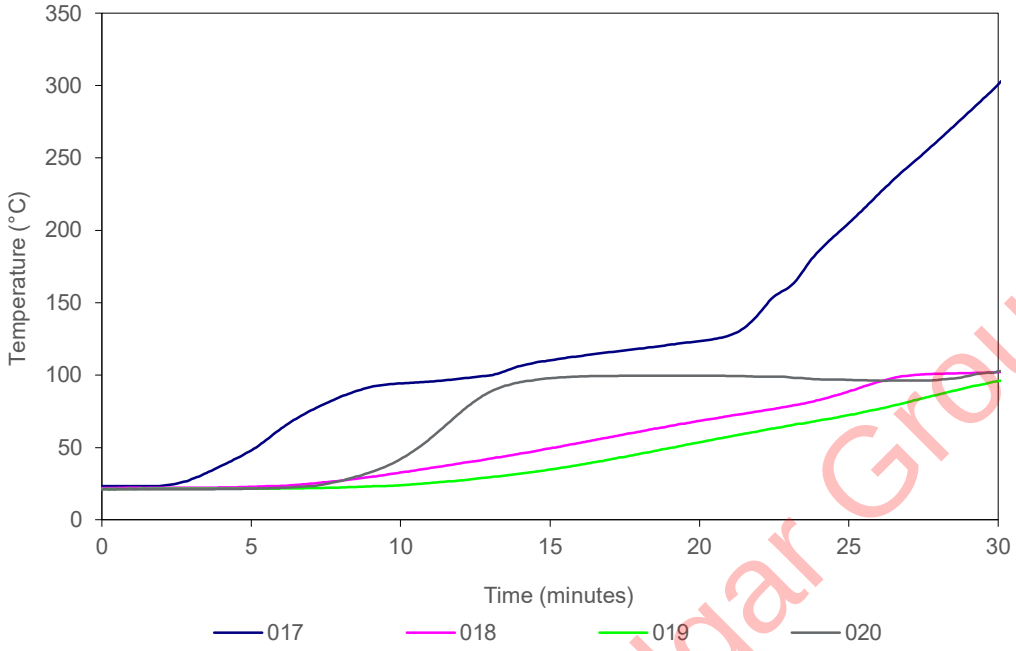


Figure 14 Timber nogging – temperature vs time

Note: TC021 TC malfunction throughout the whole test period.

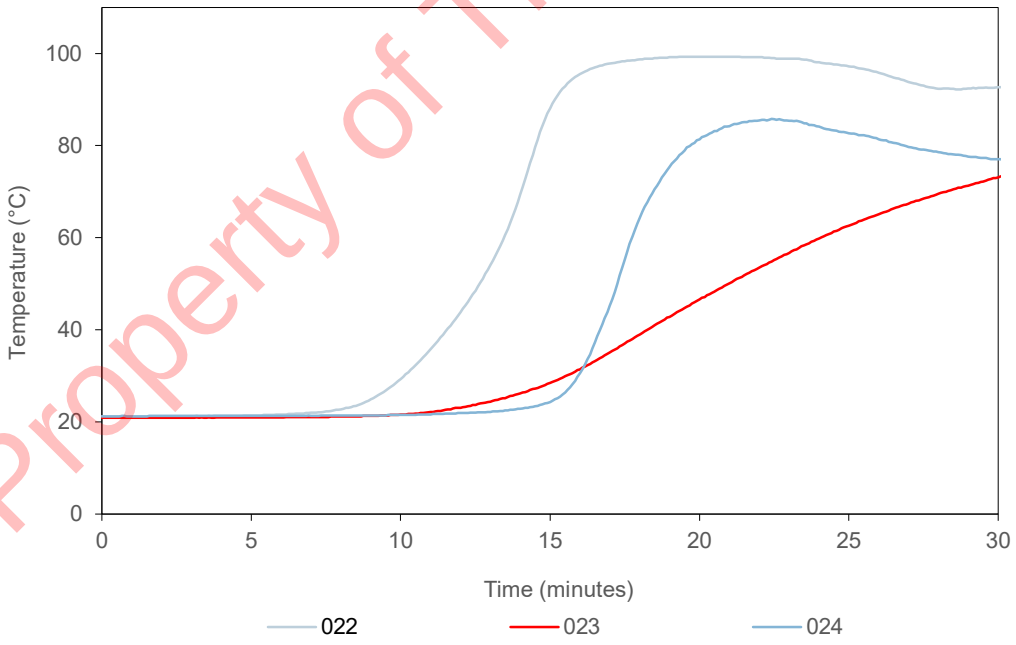


Figure 15 Timber nogging – temperature vs time

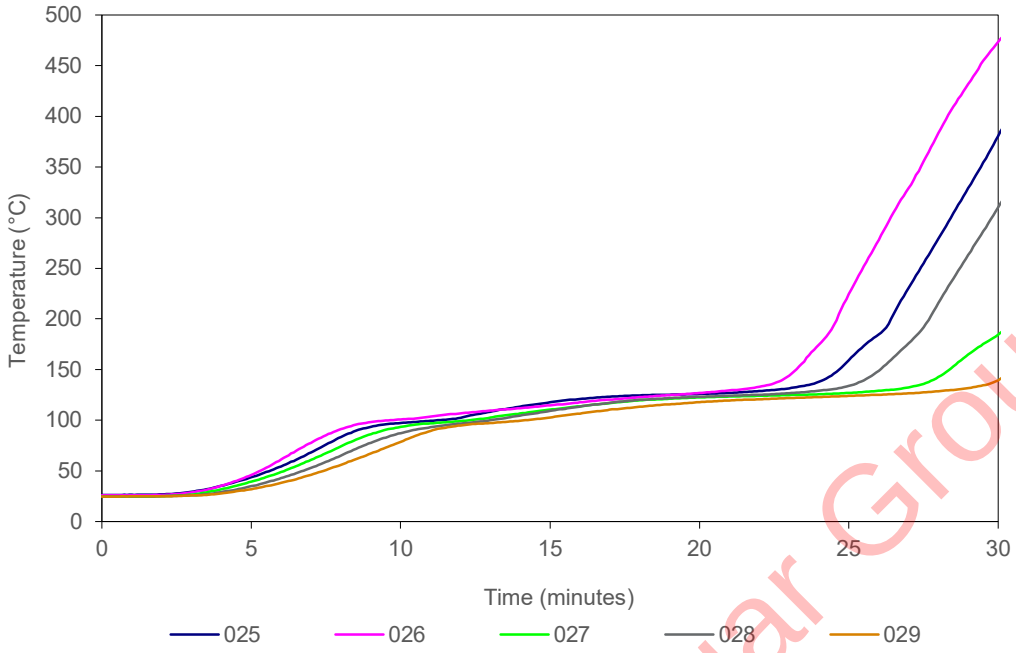


Figure 16 Internal (unexposed side of BoardeX cladding) – temperature vs time

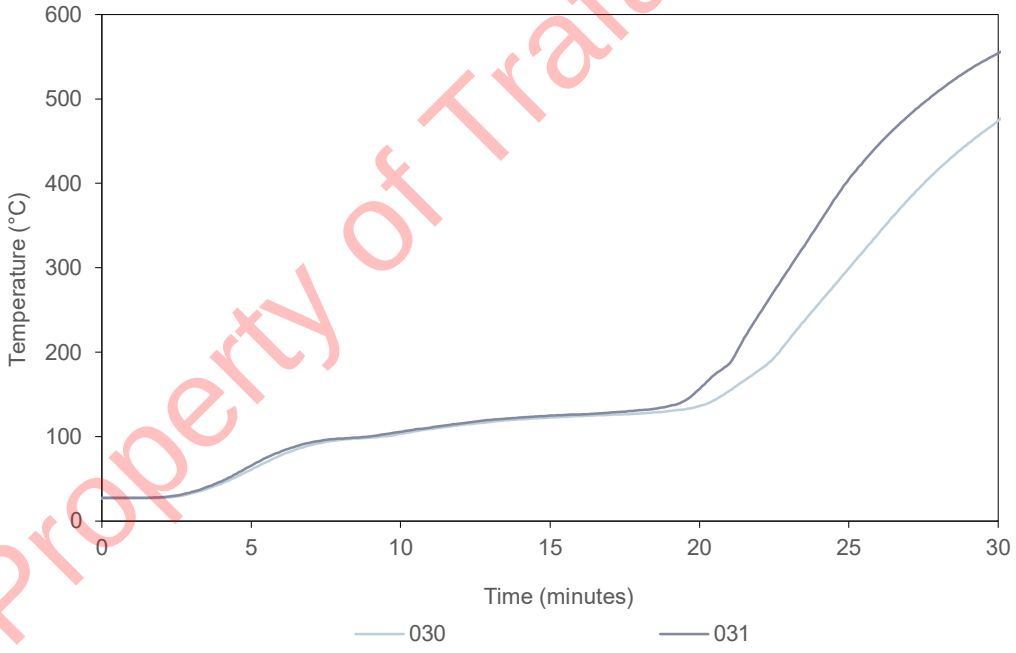


Figure 17 Internal (unexposed side of BoardeX cladding) – temperature vs time

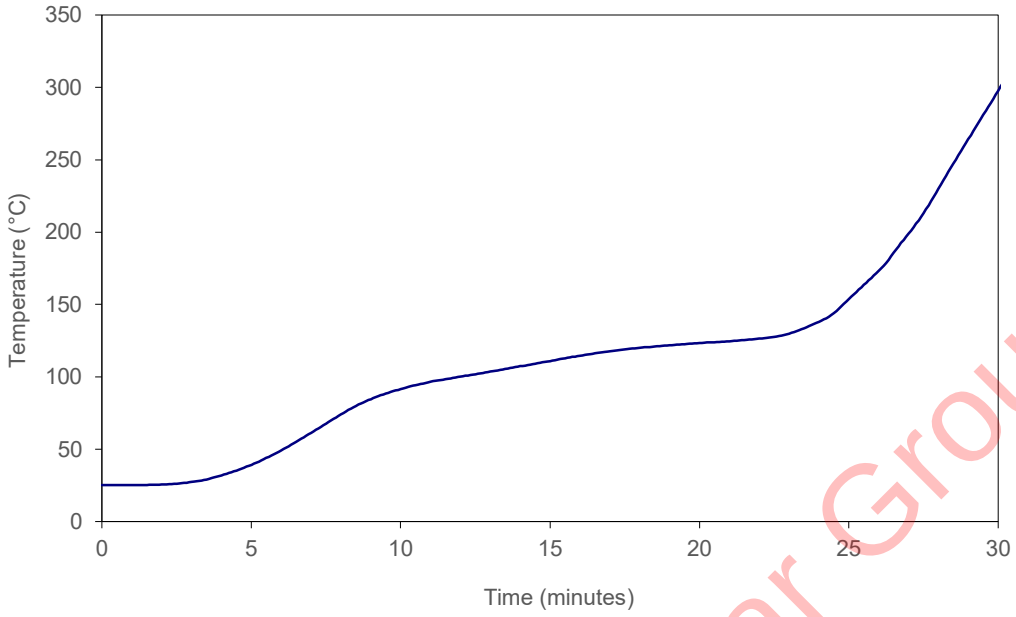


Figure 18 Internal (unexposed side of BoardeX cladding) – average temperature vs time

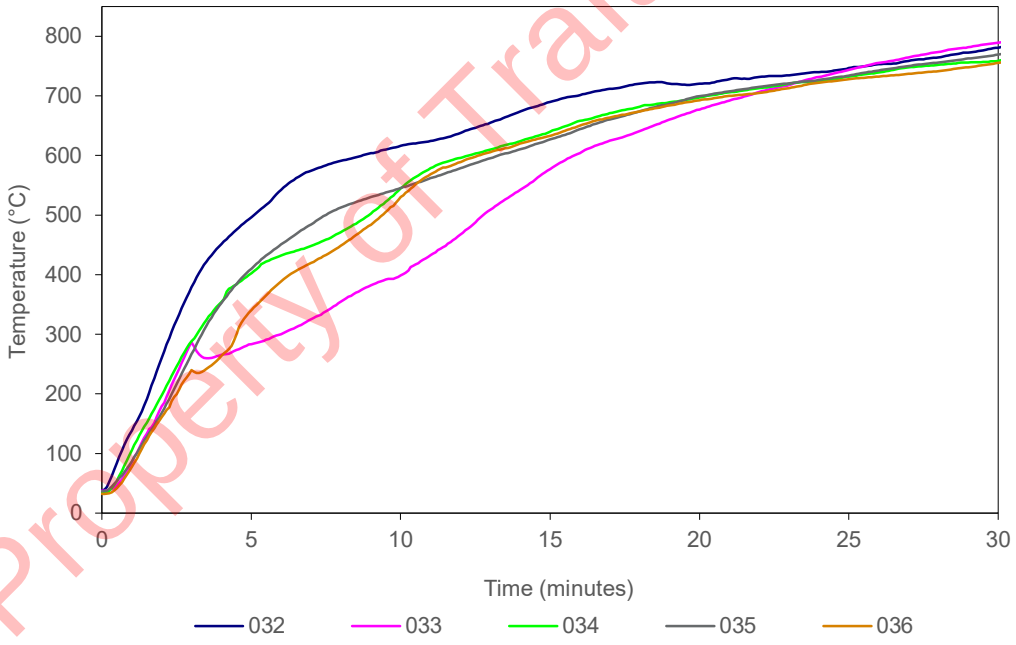


Figure 19 Internal (unexposed side of the corrugated sheet) – temperature vs time

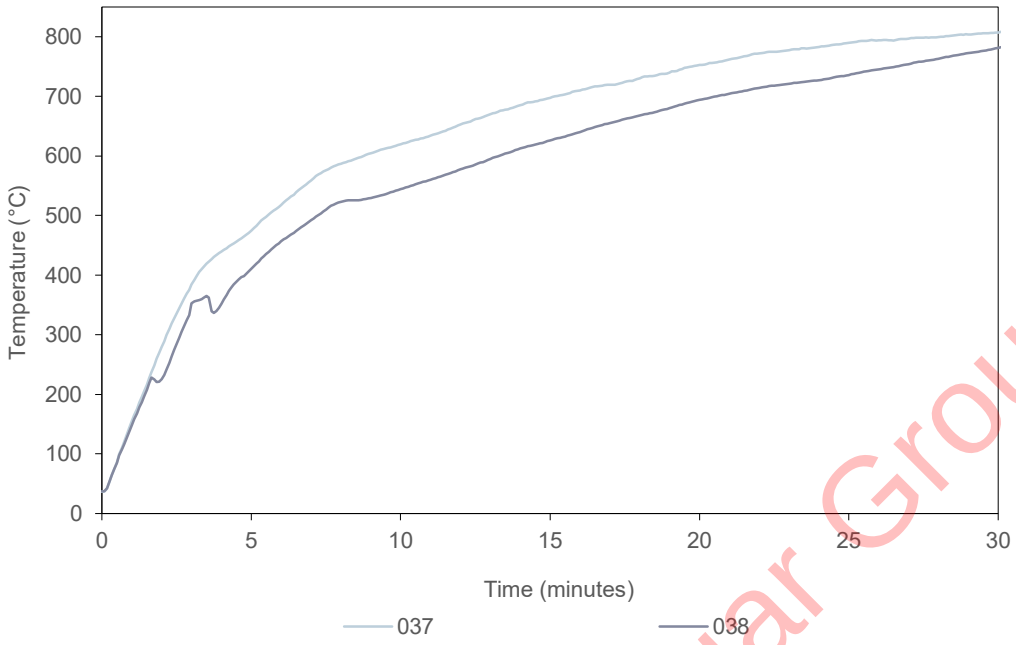


Figure 20 Internal (unexposed side of the corrugated sheet) – temperature vs time

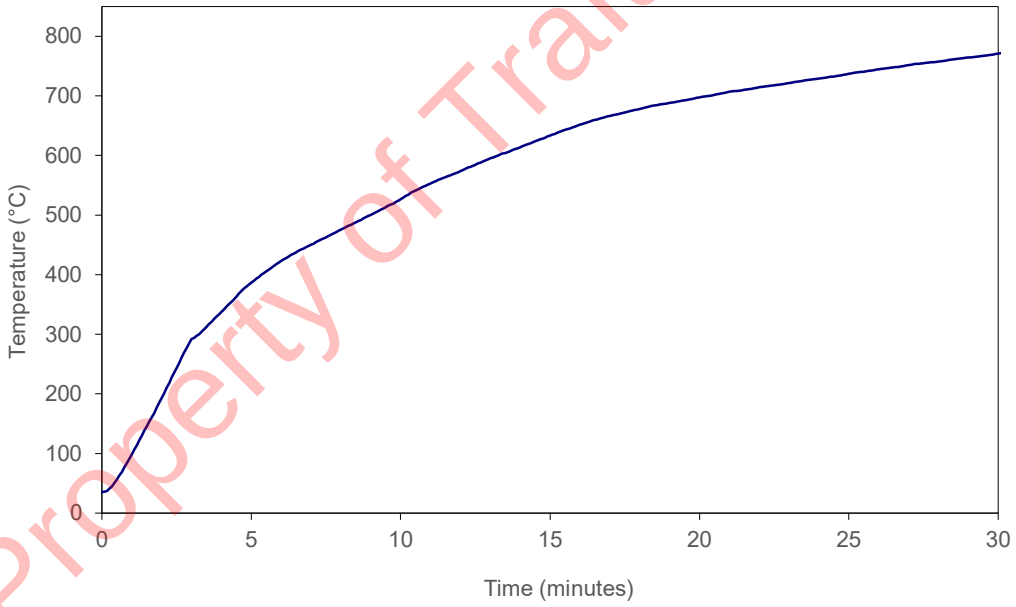


Figure 21 Internal (unexposed side of the corrugated sheet) – average temperature vs time

Table 13 Test specimen temperatures

Location	T/C #	Description[1]	Temp (°C) at t (minutes)			Limit[2] (minutes)
			t=0	t=15	t=30	
Quarter and centre points	001	Upper south quarter point.	22	34	63	–
	002	Upper north quarter point.	22	44	61	–
	003	Centre of specimen.	22	27	69	–
	004	Lower south quarter point.	22	25	67	–
	005	Lower north quarter point.	22	24	64	–
	Average		22	31	65	–
Other surface	006	At the head of the specimen, mid-width.	21	33	58	–
	007	At the head of the specimen, in line with the stud.	21	26	76	–
	008	At the junction of a stud and nogging in a framed wall system.	22	25	53	–
	009	Mid-height of the south fixed edge.	21	22	58	–
	010	Mid-height of the north free edge, 100 mm from the edge.	22	35	56	–
	011	Mid-width, 15 mm from a horizontal joint.	22	44	77	–
	012	Mid-height, 15 mm from a vertical joint.	22	25	66	–
	013	At 60 mm from the head of the specimen, mid-width.	22	27	75	–
Steel nogging	014	Steel nogging, fire side, FS	24	102	341	N/A
	015	Steel nogging, non-fire side, NFS	23	97	102	N/A
	016	Steel nogging, web, WEB	23	99	181	N/A
Timber nogging	017	Timber nogging, fire side, FS0	23	110	301	N/A
	018	Timber nogging, 10 mm from the fire side, FS10	22	49	102	N/A
	019	Timber nogging, 20 mm from the fire side, FS20	21	35	96	N/A
	020	Timber nogging, on the top side, T0	21	98	103	N/A
	021	Timber nogging, 10 mm from the top side, T10	#	#	#	N/A
	022	Timber nogging, on the bottom side, B0	21	88	93	N/A
	023	Timber nogging, 10 mm from the bottom side, B10	21	29	73	N/A
	024	Timber nogging, non-fire side, NFS	21	24	77	N/A
Internal (on the	025	Internal upper south quarter point.	27	118	381	N/A

Location	T/C #	Description[1]	Temp (°C) at t (minutes)			Limit[2] (minutes)
			t=0	t=15	t=30	
unexposed side of the BoardeX sheeting)	026	Internal upper north quarter point.	26	115	473	N/A
	027	Internal centre of specimen.	25	110	185	N/A
	028	Internal lower south quarter point.	25	109	310	N/A
	029	Internal lower north quarter point.	25	103	140	N/A
	Average		26	111	298	N/A
	030	Mid-height, 25 mm from a vertical joint.	27	123	474	N/A
	031	Mid-width, 25 mm from a horizontal joint.	28	125	554	N/A
Internal (on the unexposed side of the corrugated sheeting)	032	Internal upper south quarter point.	38	690	781	N/A
	033	Internal upper north quarter point.	38	577	789	N/A
	034	Internal centre of specimen.	33	640	759	N/A
	035	Internal lower south quarter point.	37	627	769	N/A
	036	Internal lower north quarter point.	32	633	755	N/A
	Average		36	633	771	N/A
	037	Mid-height, 25 mm from an overlap vertical joint.	37	698	807	N/A
	038	Mid-height, 25 mm from an overlap vertical joint.	37	626	781	N/A

Note:

1 Refer to

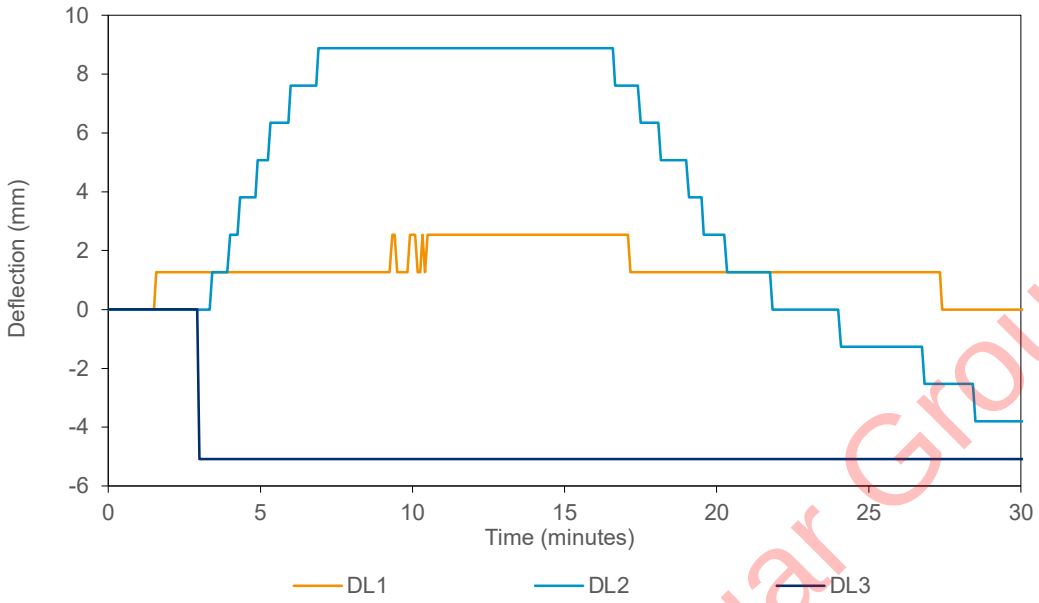
Table **10** for the locations of thermocouples as only a generic description is included in the table.

2 Limit time is the time to the nearest whole minute, rounded down to the nearest minute, at which the temperature recorded by the thermocouple does not rise by more than 180 K above the initial temperature – or the average temperature of the unexposed side quarter point thermocouples does not rise by more than 140 K above the initial temperature.

\# Thermocouple malfunction.

'–' Under limit column indicates the temperature limit was not exceeded during the test period or up until the time of integrity failure if a failure occurred.

E.4 Specimen deflections



Note:

- Positive measurements show movement of the test specimen towards the furnace.
- Negative measurements show movement of the test specimen away from the furnace.

Figure 22 Deflection of test specimen vs time – horizontal deflection

Appendix F Photographs

South

North

Figure 23 Unexposed face of the specimen before the start of the test

North

South

Figure 24 Exposed face of the specimen before the start of the test

South

North

Figure 25 Unexposed face of the specimen at the end of the test

North

South

Figure 26 Exposed face of the specimen at the end of the test

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